Introduction

Asphalt Rejuvenation
The intended use of an asphalt rejuvenator is to keep good roads in good condition.
Is there a Benefit? (Costs Benefit)

<table>
<thead>
<tr>
<th>Without a rejuvenation program an agency can assume to have</th>
<th>If the same agency adopted a rejuvenation program at year 5, 10, and 15</th>
<th>Without a rejuvenation program the need to overlay would cost the agency $224,000 for the 10th and 20th year.</th>
<th>A rejuvenation program will provide the agency a net cost savings of $182,000 per mile over that 20 year period.</th>
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<tbody>
<tr>
<td>a per mile cost of $112,000 every 10 years</td>
<td>it would cost only $42,000 per mile over the 20 year period.</td>
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In the Beginning
Today

This simplified graphic chart shows the inter-relationships of petroleum products, with gasoline, oil and asphalt flowing from the same oil well.
The chemistry of our asphalt has changed.

Today over 2000 products are obtained from diving crude oil (plastics). This loss of plasticity from the original crude crates a weakened state in our asphalt.
There are many asphalt emulsions being marketed that claim their rejuvenation capability.

The fact remains if the emulsion breaks or cures on the pavement surface then it is sealing, not rejuvenating.
From Global to Local...
Rejuvenation Starts With a Target Goal
It costs far less to prevent a problem than to have to cure it.
All asphalts harden as they age, primarily due to oxidation, loss of lighter oils (petroleum maltenes).

Hardening of asphalt takes place at different rates depending on environmental conditions and the exposure to air.

Permeable pavements or pavements with high void contents can therefore age faster. This means that pavements with open surfaces tend to age faster than those with closed surfaces.
Aging results in a binder that is more brittle. These binders eventually experience cohesive binder failures under traffic loads and stone loss or raveling.

Restoring the binder Slows deterioration, Prevents further degradation ...and Corrects the problem.
Binder Chemistry

Components of Asphalt.

First Acidaffins
Second Acidaffins
Asphaltenes
Saturated Hydrocarbons
Polar Compounds
The Problem: Pavement Deterioration

Target Goal:

Shift the binder chemistry to delay deterioration to a new or better than new state.
It is important to get the true, maltene-based rejuvenator if a change in binder chemistry is desired.”

Larry Galehouse
Past Director,
National Center for Pavement Preservation
Mr. Galehouse is referring to “Petroleum” Maltene

A Petroleum Maltene rejuvenator comes from a refinery.
### Top of the Curve Strategies

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<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td></td>
<td><strong>Rejuvenator</strong></td>
<td><strong>Asphalt Fog Seals</strong></td>
<td><strong>Thin Overlay</strong></td>
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<td><em>(Fog Seal without asphalt component)</em></td>
<td><strong>Slurry Micro Chip &amp; Seal</strong></td>
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The functional use is to revitalize cracking, to inhibit pitting and raveling, to reduce air and water permeability. This has been the same concept for the past 50+ years.

The ideal candidate is a pavement with no base failure, good profile but starting to show the early signs of distress.
Challenge of High Rap Surfaces

2017 Purdue Road School – RejuvTec Inc.
Joint Pavement Preservation

2017 Purdue Road School – RejuvTec Inc.
Preventative Maintenance is the first step in Asset Management.
Before Use of Petroleum Maltene Rejuvenator

After Use of Petroleum Maltene Rejuvenator
UK – Reversed 7 yr. Aging Process
International Market

International Distributors:

- Europe
- Scandinavia
- UK
- South America
- Mexico
- China
- Australia
- Russia
- Argentina
- Japan
Czech Republic

International Market
International Market

China

2017 Purdue Road School – RejuvTec Inc.
International Market

Holland

2017 Purdue Road School – RejuvTec Inc.
Canadian Market

Canadian Distributors:

British Columbia
Northern Alberta
Northwest Territories
Ontario
Saskatchewan
Southern Alberta
Yukon
Canadian Market

Brampton, Ontario, Canada

2017 Purdue Road School – RejuvTec Inc.
National Market

Montana

Scottsdale, AZ

Nashville, TN
Penetration and viscosity testing utilizing CalTrans test methods and DSR testing showed substantial improvement in penetration and viscosity, leading to reduced stiffness of the binder retarding the aging process. That improvement was in the 1200 to 1600 percentile range.
Local Market

Indiana Communities

Untreated

Treated

2017 Purdue Road School – RejuvTec Inc.
Local Market

Town of Avon, IN

2017 Purdue Road School – RejuvTec Inc.
Last but not least we bring you the Avon Story.

The Town of Avon, Indiana took a leap of faith 16 years ago by implementing a pro-active asphalt rejuvenation plan. The results are test proven and remarkable.

We will now turn this over to the Town of Avon to share their testimony.
Please Welcome

Ryan Cannon
Public Works Director
Town of Avon, IN

2017 Purdue Road School – RejuvTec Inc.
Target Goal

Keeping the Good Roads Good
Town of Avon

- Incorporated 1995
  - Population
    - 2000 - 6,248
    - 2010 - 12,446
  - Road mileage
    - 2000 - 34.13
    - 2013 - 108
Limited Resources - $
Unit Costs

• Pro-active Maintenance
  – Preservative Seal - $17,850 per mile
  – Restorative Seal - $22,586 per mile
  – Crack seal  - $3,765 per mile
  – Full Depth Patching - $160,300 per mile

• Reactive Maintenance
  – Resurface  - $187,800 per mile
  – Structural Overlay - $328,700 per mile
  – Recycling  - $642,600 per mile
  – Reconstruction - $965,200 per mile
Unit Costs

• Pro-active Maintenance
  – Preservative Seal - $1.00 per syd
  – Restorative Seal - $1.50 per syd
  – Crack seal - $0.25 per syd
  – Full Depth Patching - $50.00 per syd

• Reactive Maintenance
  – Resurface - $14.00 per syd
  – Structural Overlay - $22.00 per syd
  – Recycling - $35.00 per syd
  – Reconstruction - $75.00 per syd
Pavement Management

The Concept of Pavement Management

APPROACH - CATCH STREETS BEFORE THEY FAIL

- **Very Good (I)**: Focus Budget Here Before Overlay Is Required
- **Good (II/III)**: Focus Budget Here Before Overlay Is Required
- **Poor (IV)**: Focus Budget Here Before Reconstruction Is Required
- **Very Poor (V)**: Reconstruction ($75/SQ.YD.)

- **Localized Preventive Maintenance**
- **Surface Treatment ($0.91/SQ.YD.)**
- **Overlay ($5.57/SQ.YD.)**

Pavement Condition Index (PCI)

- **Very Poor (IV)**
- **Poor (IV)**
- **Good (II/III)**
- **Very Good (I)**

Pavement Management

- **APPROACH** -- CATCH STREETS BEFORE THEY FAIL

- **Focus Budget Here Before Overlay Is Required**
- **Focus Budget Here Before Reconstruction Is Required**

Pavement Age (Years)
Pavements not reaching service life
Evaluating Streets

- Easy
- Repeatable
Evaluating Streets
Generalized Rating

Town of Avon Road Review

PASER Ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Color</th>
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<tbody>
<tr>
<td>6 - 9</td>
<td>Red</td>
</tr>
<tr>
<td>4 - 6</td>
<td>Yellow</td>
</tr>
<tr>
<td>7 - 10</td>
<td>Green</td>
</tr>
</tbody>
</table>

1 inch = 3,000 feet

Date: 4/8/2013
Investigating Products and Trials
Restorative Seal – applied 2000
Preservative Sealing - 2001
Preservative Seal – 2001
Crack Sealing
Full Depth Patching
2005 test – fabric vs overlay
TruPave®
GlasGrid® TruPave®
Foam Bitumen Recycling - 2008
Pavement Preservation Methods

Nothing New...

Right Product, Right Place, Right Time
Creating and Building a Program

- Development of 5 Year plan
- Education
- Evaluate Success and Failure
Organize the Data You Have & Display
5 Year Crack Seal

Town of Avon Recommended MIP

2013 - 2018 Crack Seal
- 2013
- 2014
- 2015 (none)
- 2016 (none)
- 2017
- 2018
- All other roads
- Avon Town Boundary

1 inch = 3,000 feet
Date: 4/19/2013

Schneider
5 Year Preservative Seal
5 Year Paving/Overlay

Town of Avon
Recommended MIP

2013 - 2018 Reconstruction & Resurface
- 2013
- 2014
- 2015 (none)
- 2016 (none)
- 2017
- 2018
- All other roads
- Avon Town Boundary

1 inch = 3,000 feet
Date: 4/19/2013
### Results

- **Rating – 108 Miles of Roads**
  - 7-10: 76% - 81.62 miles
  - 4-6: 23% - 25.04 miles
  - 1-3: 1% - 1.22 miles
  - 0: 0% - 0 miles
Paser Averages 1999-2013

- PASER 1999 – 7.29
- PASER 2004 – 7.23
- PASER 2008 – 7.53
- PASER 2013 – 7.71
Commitment to Process and Program

• Stay the course and keep consistent records
  – Savings start to really materialize the further down the road you get

• Make the output available to constituents to show the programs value.
  – Convert the public to believers

• Use that output to make the case for continuing that program
  – Happy public = happy voters!
QUESTIONS?
Contact

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  317-272-0948
  rcannon@avongov.org